

from its commencement now almost to its close ; but this, in the course of nature, can only be available for a few years to come.

The Colonial establishments were instituted at the instance of the Royal Society and British Association, with a more general concurrence and approval on the part of the cultivators of science in all parts of the globe than, it is believed, were ever before manifested in regard to any purely scientific undertaking ; and with such a cordial and effective cooperation of the public authorities as is well deserving of being held in remembrance. It is for those two great scientific bodies to consider whether any, and what, steps should now be taken to procure the continuance of the researches.

March 12, 1857.

Major-General SABINE, Treas. and V.P., in the Chair.

The following communications were read :—

- I. “On the Immediate Principles of Human Excrements in the Healthy State.” By W. MARCET, M.D., F.C.S., Assistant Physician to the Westminster Hospital. Communicated by H. BENGE JONES, M.D., F.R.S. Received February 23, 1857.

(Abstract.)

In a previous paper I had the honour of communicating to the Royal Society the results of a first series of investigations on the immediate principles of the fæces of man and animals ; since then I have continued my researches on human excrements, being most ably seconded by my assistant, Mr. Frederick Dupré, Ph.D.

The new results obtained were the following :—

1. *Margarate of lime, phosphate of lime, and margarate of magnesia* were discovered to be immediate principles of human evacuations.

2. I found a new method for obtaining excretine, and its chemical formula has been established.

3. The fact that vegetable food induces the presence of margaric acid in excrements has been confirmed.

4. The existence of a comparatively large quantity of cholesterine in the spleen, which I had mentioned before as probable, has been confirmed.

When human fæces are exhausted with boiling alcohol, the fluid being rapidly strained through a cloth, a clear extract is obtained, which, on cooling, yields a deposit; this substance, being collected on a filter, is partly soluble in boiling alcohol, and there remains undissolved a residue insoluble in ether and alcohol. The residue in question being boiled with a solution of potash, dissolves almost entirely, and the addition of hydrochloric acid induces the formation of a precipitate in the solution. On examining this precipitate, it was found to consist of a crystallizable substance fusing at 60° Cent.; its structure and other properties were precisely those of *margaric acid*.

The acid filtrate contained *phosphoric acid* and *lime*. From several quantitative analyses, I concluded that there was more lime than is required to combine with the phosphoric acid in the form of the neutral phosphate, the excess of lime being exactly that which was necessary to convert the margaric acid into a neutral margarate of lime, $C_{34}H_{33}O_3 + CaO$. Consequently it followed that the three substances existed in the form of *margarate of lime* and *phosphate of lime* as immediate principles of human fæces.

The alcoholic filtrate from the deposit being allowed to stand for twenty-four hours, deposited another substance, of a nearly white appearance, and which proved to be *margarate of magnesia*.

The peculiar action of a vegetable diet on human fæces was investigated by means of experiments undertaken upon myself, when I observed that an entirely vegetable diet was attended with the formation of a large quantity of margaric acid in the excrements,—most probably not in the form of a margarate, but in the free state, inasmuch as it was obtained from the decomposition, with hydrochloric acid, of the precipitate induced by adding milk of lime to the cold and clear alcoholic extract of fæces, after the separation of the above-described deposits.

In the month of December 1855, I had an opportunity of noticing that during a cold night, when the temperature falls below the

freezing-point, *excretine* crystallizes readily and in large quantity in the clear alcoholic extract of fæces; this method I employed as often as possible, to prepare enough excretine for its chemical analysis; but the cold weather not lasting long enough, and this season having been remarkably mild, I was compelled to adopt a modification of the process by milk of lime, described in my former communication.

Having prepared a sufficient quantity of excretine, partly by the action of cold, and partly by means of milk of lime, the chemical composition of this substance was now determined. A qualitative analysis showed it to consist of carbon, hydrogen, sulphur and oxygen*; there was no water of crystallization present. Oxide of copper was employed at first for the combustions, but they were subsequently undertaken with chromate of lead, on account of the large proportion of carbon that excretine contains; no substance having been found to combine with it, its atomic composition was calculated from the assumption that one equivalent contained one equivalent of sulphur; and the following formula was obtained:—

78 eq. Carbon	468
78 eq. Hydrogen	78
1 eq. Sulphur	16
2 eq. Oxygen	16
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Atomic weight of Excretine	578

I shall not add more at present as to the properties of excretine; the plate which accompanies the paper illustrates the shape and arrangement of its crystals.

In my former communication I had stated that when the tissue of the spleen is submitted to a process of analysis similar to that adopted for the extraction of excretine, a substance closely allied to cholesterine is obtained. This subject being one of great importance in a physiological point of view, I have resumed the investigation, and placed beyond doubt that this substance is really *cholesterine*. Its

* In my former communication I had erroneously stated that excretine contained nitrogen, which resulted from my not having been able to prepare a sufficiently large quantity of the substance; and, moreover, it might not have been perfectly pure.

presence in the spleen is evidently independent of that which might exist in the blood retained by this organ after death. Is it that the spleen secretes cholesterine? This can only be determined by actual experiment; but it is very remarkable that a part of the blood which is supplied to the liver should come directly from an organ containing large quantities of a substance known to enter into the composition of the bile.

II. "Description of a Chronometer Compass." By RALPH REEDER, Esq., of Cincinnati, U. S. Communicated by Capt. WASHINGTON, R.N., F.R.S. Received Feb. 26, 1857.

This instrument is a combination of the Universal Dial and Chronometer, and is intended to show the errors of the magnetic needle, both at sea and on land, and, in clear weather, to perform in place of the needle.

III. Extract of a Letter addressed to General SABINE, R.A. Treas. and V.P.R.S., by M. R. WOLF, dated Zurich, March 7, 1857. Communicated by Gen. SABINE.

J'avais l'honneur de vous envoyer le 2^me numéro de mes 'Mittheilungen über die Sonnenflecken,' dans lequel j'ai développé que mes observations des tâches du soleil dans les années 1849 à 1855 prouvent assez clairement, qu'il y a dans ces phénomènes curieux une période correspondante avec l'année terrestre, dont les deux minima correspondent aux deux époques où la terre passe par le plan contenant l'axe du soleil et une parallèle à l'axe de la terre,—les deux maxima aux deux époques où la terre s'éloigne le plus de ce plan. Depuis ce temps-là j'ai trouvé qu'il y a une période correspondante dans les variations du magnétisme terrestre. En combinant les variations en déclinaison observées sur l'hémisphère boréale avec celles de l'hémisphère australe, pour éliminer l'influence de la déclinaison du soleil, j'ai trouvé une période annuelle pour ces variations, dans laquelle les deux minima et le deux maxima se présentent encore plus claires que dans les tâches solaires, et de même encore plus rapprochés des